FIG. 1A

KCNQ5 cDNA coding sequence

```
atgaaggatg tggagtcggg ccggggcagg gtgctgctga   40
actcggcagc cgccaggggc gacggcctgc tactgctggg   80
cacccgcgcg gccacgcttg gtggcggcgg cggtggcctg  120
agggagagcc gccggggcaa gcaggggcc cggatgagcc   160
tgctggggaa gccgctctct tacacgagta gccagagctg  200
ccggcgcaac gtcaagtacc ggcgggtgca gaactacctg  240
tacaacgtgc tggagagacc ccgcggctgg gcgttcatct  280
accacgcttt cgtttttctc cttgtctttg gttgcttgat  320
tttgtcagtg ttttctacca tccctgagca cacaaaattg  360
gcctcaagtt gcctcttgat cctggagttc gtgatgattg  400
tcgtctttgg tttggagttc atcattcgaa tctggtctgc  440
gggttgctgt tgtcgatata gaggatggca aggaagactg  480
aggtttgctc gaaagccctt ctgtgttata gataccattg  520
ttcttatcgc ttcaatagca gttgtttctg caaaaactca  560
gggtaatatt tttgccacgt ctgcactcag aagtctccgt  600
ttcctacaga tcctccgcat ggtgcgcatg gaccgaaggg  640
gaggcacttg gaaattactg ggttcagtgg tttatgctca  680
cagcaaggaa ttaatcacag cttggtacat aggatttttg  720
gttcttattt tttcgtcttt ccttgtctat ctggtggaaa  760
```

FIG. 1B

aggatgccaa taaagagttt tctacatatg cagatgctct 800

ctggtggggc acaattacat tgacaactat tggctatgga 840

gacaaaactc ccctaacttg gctgggaaga ttgctttctg 880

caggctttgc actccttggc atttctttct ttgcacttcc 920

tgccggcatt cttggctcag gttttgcatt aaaagtacaa 960

gaacaacacc gccagaaaca ctttgagaaa agaaggaacc 1000

cagctgccaa cctcattcag tgtgtttggc gtagttacgc 1040

agctgatgag aaatctgttt ccattgcaac ctggaagcca 1080

cacttgaagg ccttgcacac ctgcagccct accaagaaag 1120

aacaagggga agcatcaagc agtcagaagc taagttttaa 1160

ggagcgagtg cgcatggcta gccccagggg ccagagtatt 1200

aagagccgac aagcctcagt aggtgacagg aggtccccaa 1240

gcaccgacat cacagccgag ggcagtccca ccaaagtgca 1280

gaagagctgg agcttcaacg accgaacccg cttccggccc 1320

tcgctgcgcc tcaaaagttc tcagccaaaa ccagtgatag 1360

atgctgacac agcccttggc actgatgatg tatatgatga 1400

aaaaggatgc cagtgtgatg tatcagtgga agacctcacc 1440

ccaccactta aaactgtcat tcgagctatc agaattatga 1480

aatttcatgt tgcaaaacgg aagtttaagg aaacgttacg 1520

tccatatgat gtaaaagatg tcattgaaca atattctgct 1560

FIG. 1C

```
ggtcatctgg acatgttgtg tagaattaaa agccttcaaa  1600

cacgtgttga tcaaattctt ggaaaagggc aaatcacatc  1640

agataagaag agccgagaga aaataacagc agaacatgag  1680

accacagacg atctcagtat gctcggtcgg gtggtcaagg  1720

ttgaaaaaca ggtacagtcc atagagtcca agctggactg  1760

cctactagac atctatcaac aggtccttcg gaaaggctct  1800

gcctcagccc tcgctttggc ttcattccag atcccacctt  1840

ttgaatgtga acagacatct gactatcaaa gccctgtgga  1880

tagcaaagat ctttcgggtt ccgcacaaaa cagtggctgc  1920

ttatccagat caactagtgc caacatctcg agaggcctgc  1960

agttcattct gacgccaaat gagttcagtg cccagacttt  2000

ctacgcgctt agccctacta tgcacagtca agcaacacag  2040

gtgccaatta gtcaaagcga tggctcagca gtggcagcca  2080

ccaacaccat tgcaaaccaa ataaatacgg cacccaagcc  2120

agcagcccca acaactttac agatcccacc tcctctccca  2160

gccatcaagc atctgcccag gccagaaact ctgcacccta  2200

accctgcagg cttacaggaa agcatttctg acgtcaccac  2240

ctgccttgtt gcctccaagg aaaatgttca ggttgcacag  2280

tcaaatctca ccaaggaccg ttctatgagg aaaagctttg  2320

acatgggagg agaaactctg ttgtctgtct gtcccatggt  2360

gccgaaggac ttgggcaaat ctttgtctgt gcaaaacctg  2400

atcaggtcga ccgaggaact gaatatacaa ctttcaggga  2440
```

FIG. 1D

```
gtgagtcaag tggctccaga ggcagccaag atttttaccc  2480

caaatggagg gaatccaaat tgtttataac tgatgaagag  2520

gtgggtcccg aagagacaga gacagacact tttgatgccg  2560

caccgcagcc tgccagggaa gctgcctttg catcagactc  2600

tctaaggact ggaaggtcac gatcatctca gagcatttgt  2640

aaggcaggag aaagtacaga tgccctcagc ttgcctcatg  2680

tcaaactgaa ataa                              2694
```

FIG. 2A

KCNQ5 Protein Sequence

MKDVESGRGR	VLLNSAAARG	DGLLLLGTRA	ATLGGGGGGL	40
RESRRGKQGA	RMSLLGKPLS	YTSSQSCRRN	VKYRRVQNYL	80
YNVLERPRGW	AFIYHAFVFL	LVFGCLILSV	FSTIPEHTKL	120
ASSCLLILEF	VMIVVFGLEF	IIRIWSAGCC	CRYRGWQGRL	160
RFARKPFCVI	DTIVLIASIA	VVSAKTQGNI	FATSALRSLR	200
FLQILRMVRM	DRRGGTWKLL	GSVVYAHSKE	LITAWYIGFL	240
VLIFSSFLVY	LVEKDANKEF	STYADALWWG	TITLTTIGYG	280
DKTPLTWLGR	LLSAGFALLG	ISFFALPAGI	LGSGFALKVQ	320
EQHRQKHFEK	RRNPAANLIQ	CVWRSYAADE	KSVSIATWKP	360
HLKALHTCSP	TKKEQGEASS	SQKLSFKERV	RMASPRGQSI	400
KSRQASVGDR	RSPSTDITAE	GSPTKVQKSW	SFNDRTRFRP	440
SLRLKSSQPK	PVIDADTALG	TDDVYDEKGC	QCDVSVEDLT	480
PPLKTVIRAI	RIMKFHVAKR	KFKETLRPYD	VKDVIEQYSA	520
GHLDMLCRIK	SLQTRVDQIL	GKGQITSDKK	SREKITAEHE	560
TTDDLSMLGR	VVKVEKQVQS	IESKLDCLLD	IYQQVLRKGS	600
ASALALASFQ	IPPFECEQTS	DYQSPVDSKD	LSGSAQNSGC	640
LSRSTSANIS	RGLQFILTPN	EFSAQTFYAL	SPTMHSQATQ	680
VPISQSDGSA	VAATNTIANQ	INTAPKPAAP	TTLQIPPPLP	720
AIKHLPRPET	LHPNPAGLQE	SISDVTTCLV	ASKENVQVAQ	760
SNLTKDRSMR	KSFDMGGETL	LSVCPMVPKD	LGKSLSVQNL	800
IRSTEELNIQ	LSGSESSGSR	GSQDFYPKWR	ESKLFITDEE	840

FIG. 2B

VGPEETETDT FDAAPQPARE AAFASDSLRT GRSRSSQSIC 880

KAGESTDALS LPHVKLK 897

FIG. 3

Alternative Splice Exon 1

TGG	GGA	CAG	TGG	ACA	TTG	CGT
Trp	Gly	Gln	Trp	Thr	Leu	Arg

FIG. 4A

3' UTR

```
gttcttcatt ttctttccag gcatagcagt tctttagcca        40
tacatatcat tgcatgaact atttcgaaag cccttctaaa        80
aagttgaaat tgcaagaatc gggaagaaca tgaaaggcag       120
tttataagcc cgttaccttt taattgcatg aaaatgcatg       160
tttagggatg gctaaaattc caaggtgcat cgacattaac       200
ccactcattt agtaatgtac cttgagttaa aaagcctgag       240
aaaccaaaca cagctaatgc tatggggtgt atgaatatgt       280
caagtttagg tcatttagaa gatttgacac tgtattttga       320
aattatgagt aaacaccttc aaatttcagg catttctgct       360
ttgtgactaa atacaaacta cattttcaag attaggccat       400
aatgtatatt taaacacaat ggctatcaac agctgctaat       440
aaggtatcaa ctaaagcaga attggggaat aatagaaatg       480
gctgcttatt tcaagatata tttgccaacc cattcctatt       520
cagtcatttt attattaatg taatttgaat gtcaatttgt       560
gtgcttttgg tgatttagcg ctgtggcaag caattttgca       600
catcattttc atgttgttct ttatgacaag aatgttcttc       640
aattagaaaa tgtgcaaata atgaaattca gggccagtga       680
ggcaaataga ctatctgaca tatttgactt tatgaaaaca       720
tattgcctga tggcagaatc aactttataa gtggtcaact       760
tctacacaag cgtatgaaat actggtcagt agaacagcca       800
```

FIG. 4B

```
ttgtgattgg actggtttct ctgcaatggc gccaacccca      840

ggcttgccaa tactgcctat gtaaagggca agtgtgagaa      880

gctattctca tttcgctgac atacaggtag gactatgggg      920

gatgggacat ttgagtggga ctgagatagg aaaggcttga      960

aaagaaccca gaaacaccac caggaagttg gcaaagtaaa     1000

agaaaatgac ttccccctca aagggcaatg agagggagag     1040

aaacaaacca aaatagaaga actagacttt ttagaaaatg     1080

agtattgcta                                     1090
```

FIG. 5A

Multiple Sequence Alignment of the KCNQ Channel Family Members

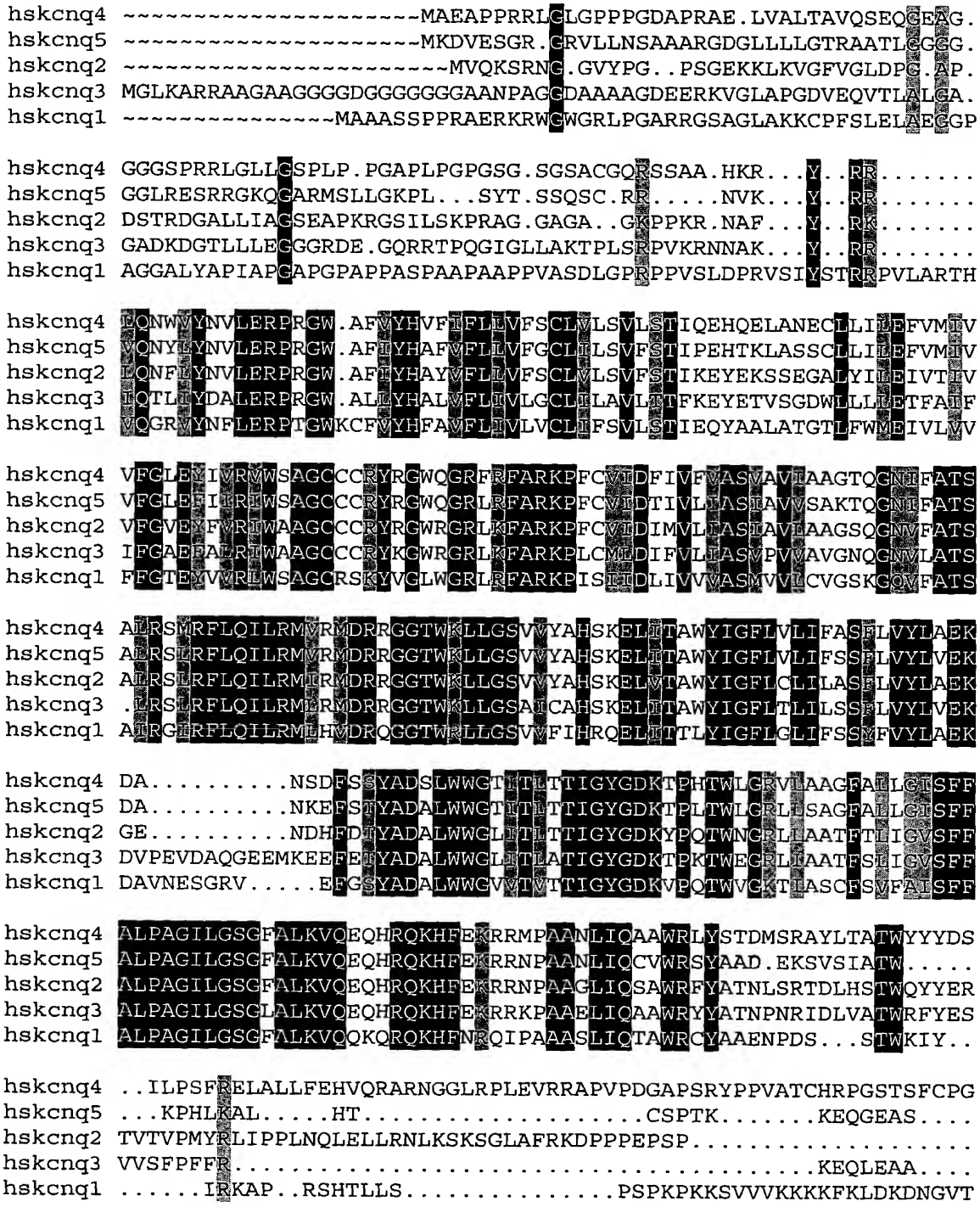


FIG. 5B

```
hskcnq4 ESSRMGIKDRIRMGSSQRRTGPS.KQQLAPPTMPTSPSSEQVGEATSPTKVQKSWSFNDR
hskcnq5 SSQKLSFKERVRMASPRGQSIKS.RQ..ASVGDRRSPSTDITAEG.SPTKVQKSWSFNDR
hskcnq2 .SQKVSLKDRV.FSSPRGVAAKG.KGSPQAQTVRRSPSADQSLE.DSPSKVPKSWSFGDR
hskcnq3 SSQKLGLLDRVRLSNPRGSNTKG.KLF........TPLNVDAIE.ESPSKEPKPVGLNNK
hskcnq1 PGEKMLTVPHITCDPPEERRLDHFSVDGYDSSVRKSPT...LLEVSMP............

hskcnq4 TRFRASLRL.....KPRTSAEDA.PSEEVAEEKSYQCELTVDDIMPAVKTVIRSIRILKF
hskcnq5 TRFRPSLRLKSSQPKPVIDADTALGTDDVYDEKGCQCDVSVEDLTPPLKTVIRAIRIMKF
hskcnq2 SRARQAFRIKGAASR.QNSEEASLPGEDIVDDKSCPCEFVTEDLTPGLKVSIRAVCVMRF
hskcnq3 ERFRTAFRMKAYAFWQ..SSEDAGTGDPMAEDRGYGNDFPIEDMIPTLKAAIRAVRILQF
hskcnq1 .HF...MRTNSFAEDLDLEGETLLT..PITH.........ISQLREHHRATIKVIRRMQY

hskcnq4 LVAKRKFKETLRPYDVKDVIEQYSAGHLDMLGRIKSLQTRVDQIVGRG...PGDR.KARE
hskcnq5 HVAKRKFKETLRPYDVKDVIEQYSAGHLDMLCRIKSLQTRVDQILGKGQI.TSDK.KSRE
hskcnq2 LVSKRKFKESLRPYDVMDVIEQYSAGHLDMLSRIKSLQSRVDQIVGRGPA.ITD..KDR.
hskcnq3 RLYKKKFKETLRPYDVKDVIEQYSAGHLDMLSRIKYLQTRIDMIFTPGPP.STPKHKKSQ
hskcnq1 FVAKKKFQQARKPYDVRDVIEQYSQGHLNLMVRIKELQRRLDQSIGKPSLFISVSEKSKD

hskcnq4 KGDKG................PSDAEVVDEISMMGRVVKVE..KQVQSIEHKLDLLLGFY
hskcnq5 ...KI................TAEHETTDDLSMLGRVVKVE..KQVQSIESKLDCLLDIY
hskcnq2 ..TKG................PAEAELPEDPSMMGRLGKVE..KQVLSMEKKLDFLVNIY
hskcnq3 KGSAFTFPSQQSPRNEPYVARPSTSEI.EDQSMMGKFVKVE..RQVQDMGKKLDFLVDMH
hskcnq1 RGSNTIGARLNRVEDKVTQLDQRLALITD...MLHQLLSLHGGSTPGSGGPPREGGAHIT

hskcnq4 SRCLRSGT..SA.SLGAVQVPLFDPDITSDYHSPVDH..EDISVSAQTLS.ISRSVSTNM
hskcnq5 QQVLRKGSA.SALALASFQIPPFECEQTSDYQSPVDS..KDLSGSAQNSGCLSRSTSANI
hskcnq2 MQ..RMGIP.PTETEAYFGAK..EPEPAPPYHSPEDS..RE...HVDRHGCIVKIVRSSS
hskcnq3 MQHMER...........LQVQVTEYYPTKGTSSPAEAEKKEDNRYSDLKTIICNYSETGP
hskcnq1 QPCGSGGSVDPELFLPSNTLPTYE.QLTVPRRGPDEGS~~~~~~~~~~~~~~~~~~~~~~

hskcnq4 D~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
hskcnq5 SRGLQFI..LTPNEFSAQTFYALSPTMHSQATQVPISQSDGSAVAATNTIANQINTAPKP
hskcnq2 STGQKNF..SAPPAAPP....VQCPPSTSWQPQSHPRQGHGTSPVGDHGSLVRIPPPPAH
hskcnq3 PEPPYSFHQVTIDKVSPYGFFAHDPVNLPRGGPSS.GKVQATPPSSATTYVERPTVLPIL
hskcnq1 ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

hskcnq4 ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
hskcnq5 AAPTTLQIPPPLPAIKHLPRPETLHPNPAGLQESISDVTTCLVASKENVQVAQSNLTKDR
hskcnq2 ERSLSAYGGGNRASMEFLRQEDTPGCRPPEGTLRDSDTSISIPSVDHEELERSFSGFSIS
hskcnq3 TLLDSRVSCHSQADLQG.PYSDRISPRQRRSITRDSDTPLSLMSVNHEELERSPSGFSIS
hskcnq1 ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

hskcnq4 ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
hskcnq5 SMRKSFDMGGETLLSVCPMVPK....DLGKSLSVQNLIRSTEELNIQLSGSESSGSRGSQ
hskcnq2 QSKENLDALNSCYAAVAPCAKVRPYIAEGESDTDSDLCTPCGPPPRSATGEGPFGDVGWA
hskcnq3 QDRDDYVFGPN...GGSSWMREKRYLAEGETDTDTDPFTPSGSMPLSSTGDGISDSVWTP
hskcnq1 ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
```

FIG. 5C

```
hskcnq4 ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
hskcnq5 DFYPKWRESKLFITDEEVGPEETETDTFDAAPQPAREAAFASDSLRTGRSRSSQSICKAG
hskcnq2 GPRK~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
hskcnq3 SNKPI~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
hskcnq1 ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

hskcnq4 ~~~~~~~~~~~~~~~
hskcnq5 ESTDALSLPHVKLK
hskcnq2 ~~~~~~~~~~~~~~~
hskcnq3 ~~~~~~~~~~~~~~~
hskcnq1 ~~~~~~~~~~~~~~~
```

FIG. 6A

Human RNA Master Blot

TABLE 1

	1	2	3	4	5	6	7	8
A	whole brain	amygdala	Caudate nucleus	cerebellu m	cerebral cortex	frontal lobe	hippocampus	medulla oblongata
B	occipital pole	putamen	substantia nigra	temporal lobe	thalamus	Subthalamic nucleus	spinal cord	
C	heart	aorta	Skeletal muscle	colon	bladder	uterus	prostate	stomach
D	testis	ovary	pancreas	pituitary gland	adrenal gland	thyroid gland	salivary gland	mammary gland
E	kidney	liver	small intestine	spleen	thymus	peripheral leukocyte	lymph node	bone marrow
F	Appendix	lung	trachea	placenta				
G	fetal brain	fetal heart	fetal kidney	fetal liver	fetal spleen	fetal thymus	fetal lung	
H	yeast total RNA	yeast tRNA	E. *coli* rRNA	E. *coli* DNA	Poly r(A)	human C_0t DNA	human DNA	human DNA

FIG. 6B

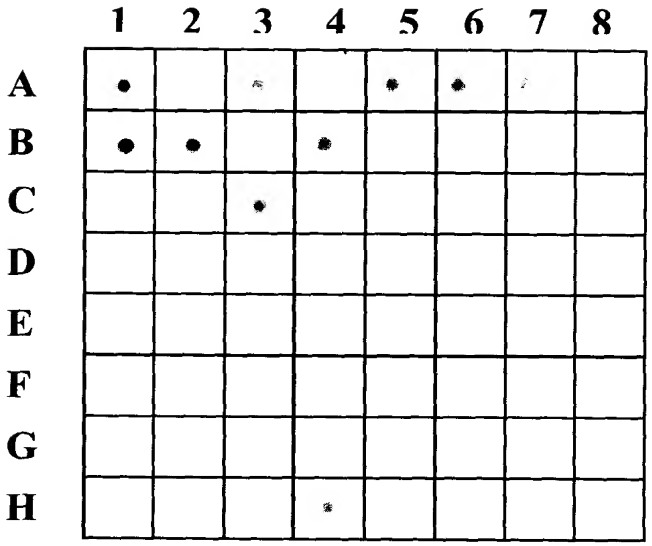


FIG. 7

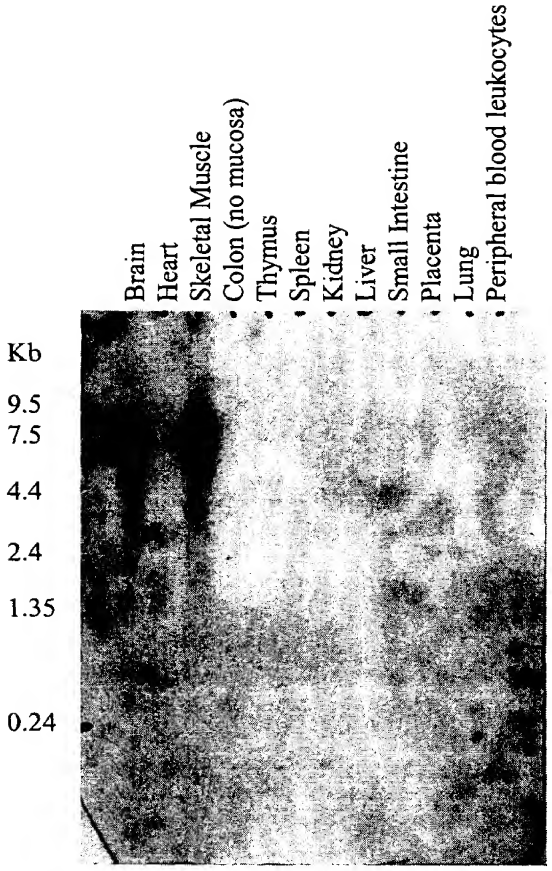
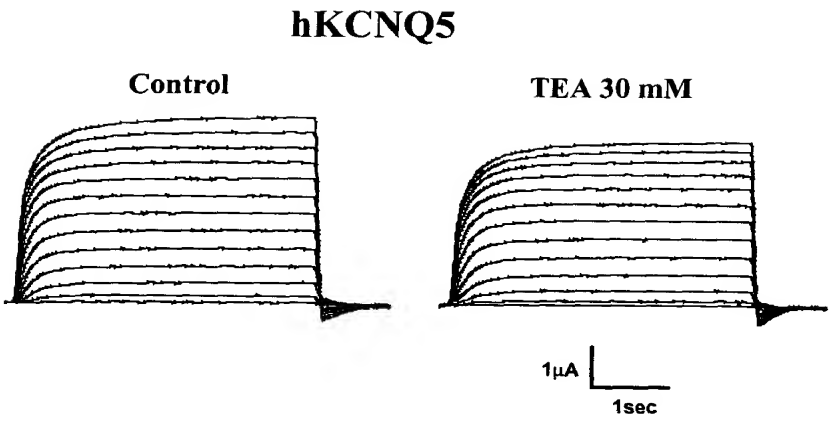

Brain
Heart
Skeletal Muscle
Colon (no mucosa)
Thymus
Spleen
Kidney
Liver
Small Intestine
Placenta
Lung
Peripheral blood leukocytes
Kb
9.5
7.5
4.4
2.4
1.35
0.24

FIG. 8



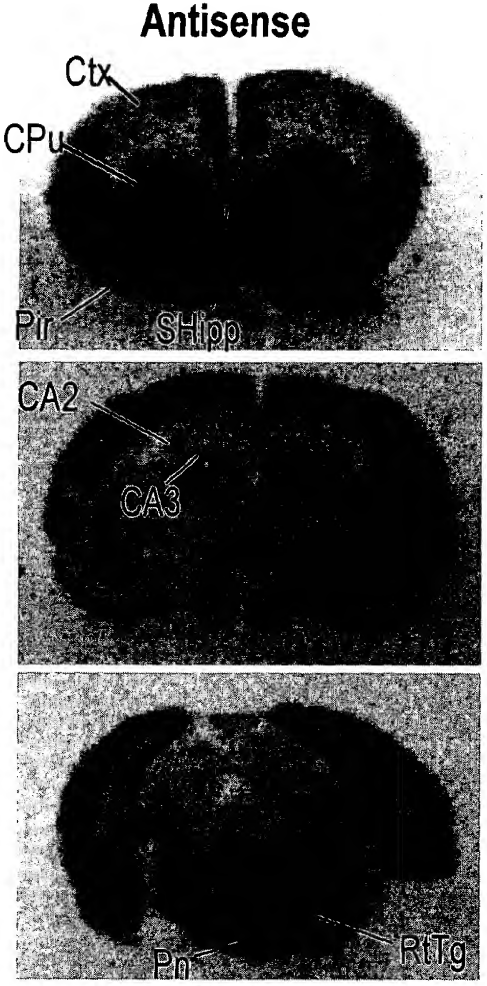


FIG. 9A

FIG. 9B

FIG. 9C

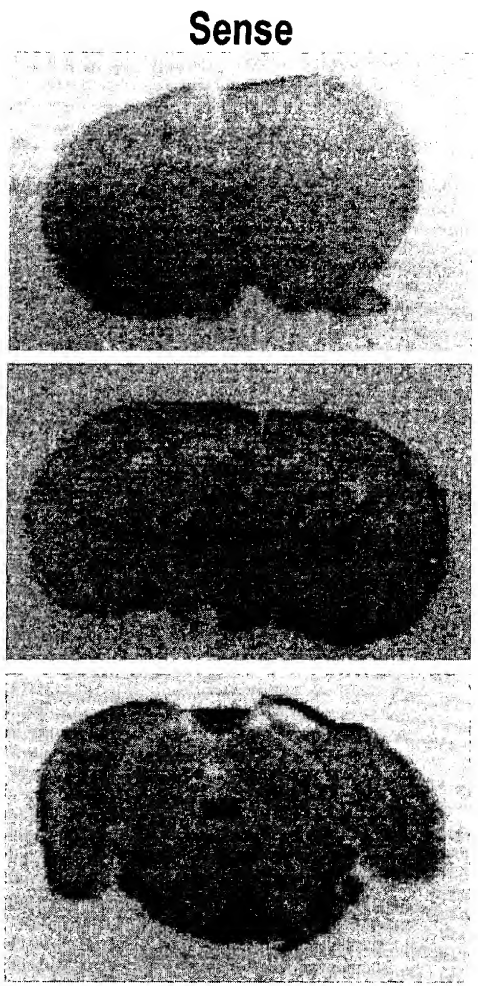


FIG. 9D

FIG. 9E

FIG. 9F

FIG. 10A

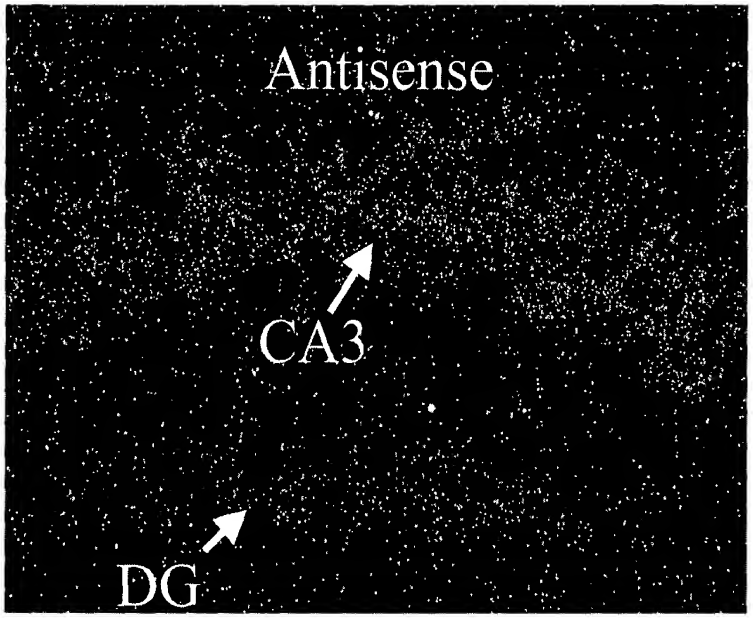


FIG. 10B

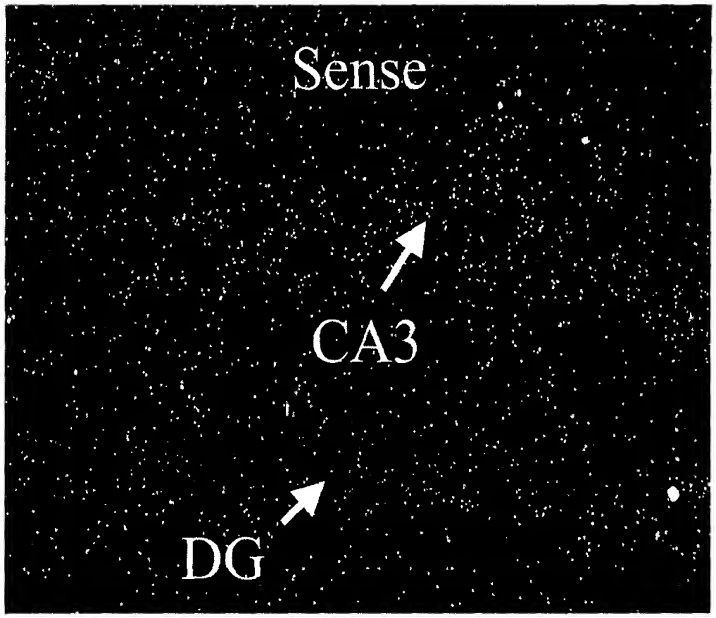


FIG. 11

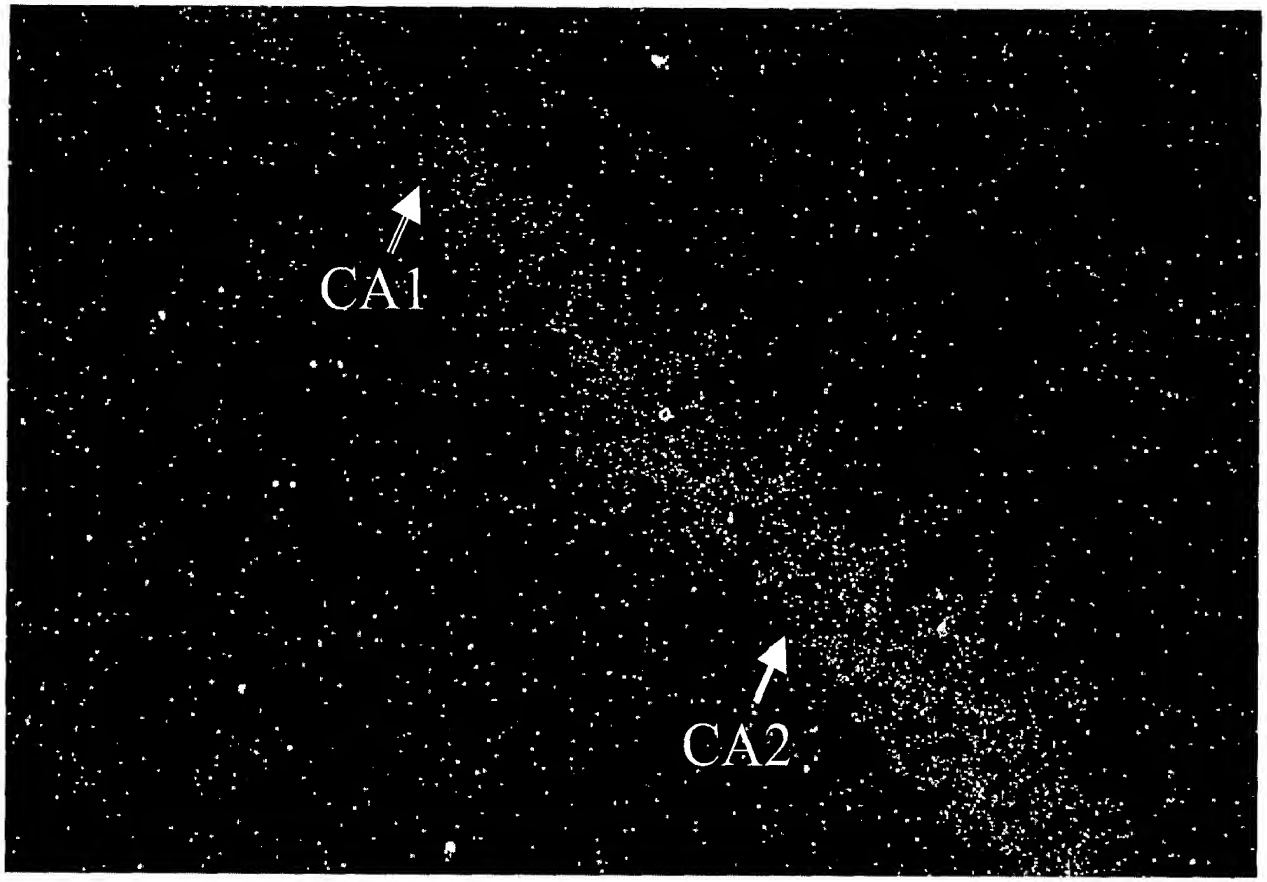


FIG. 12A

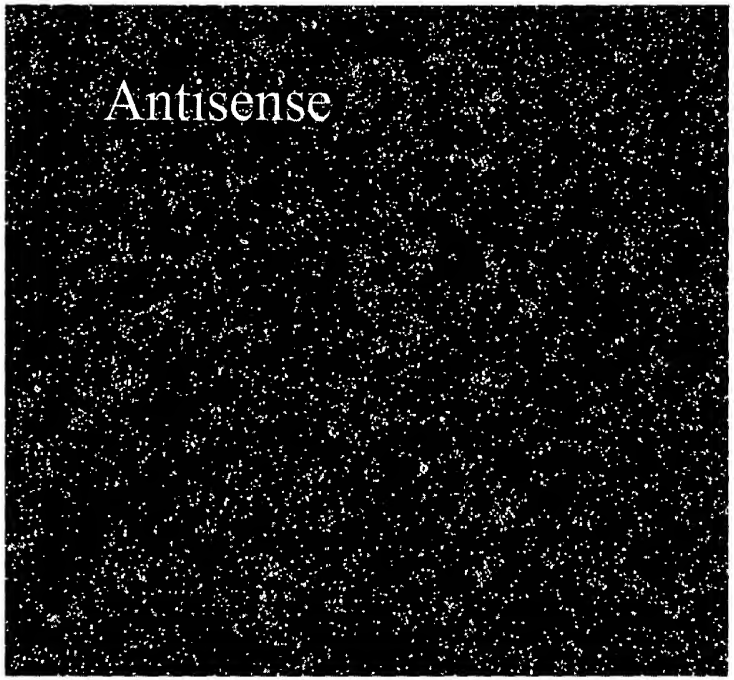


FIG. 12B

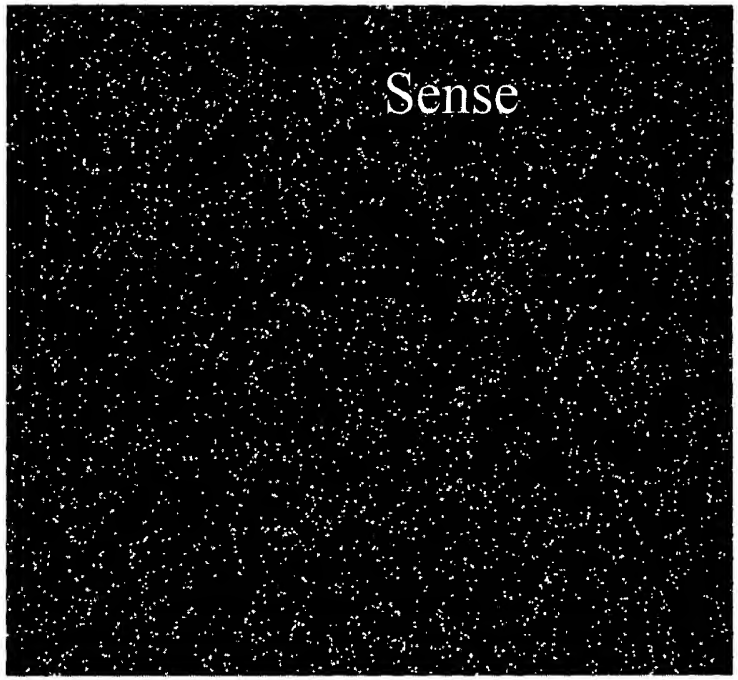


FIG. 13A

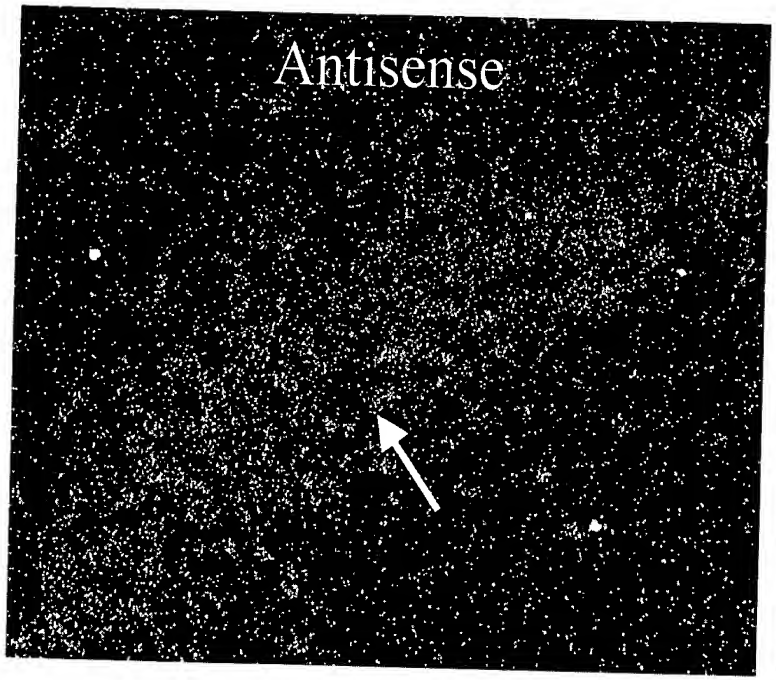


FIG. 13B

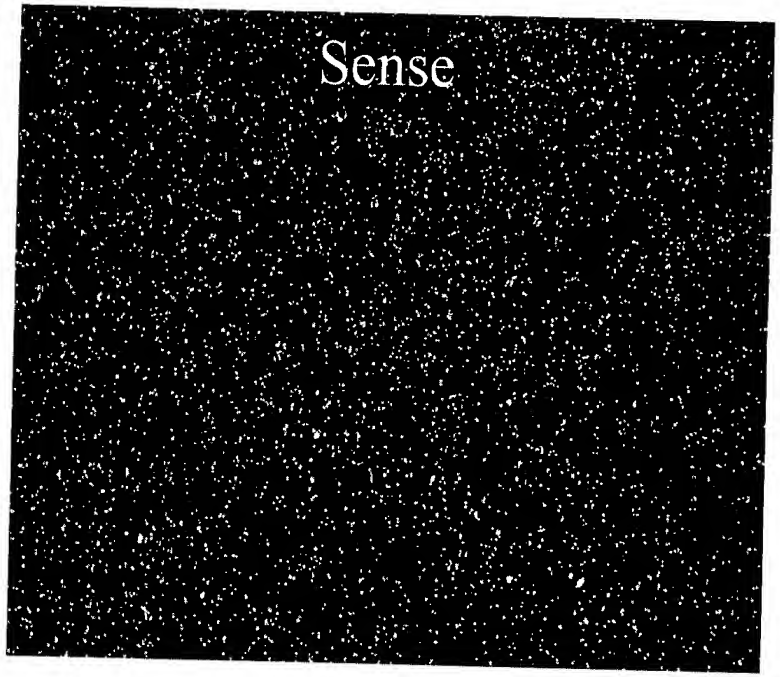


FIG. 14A

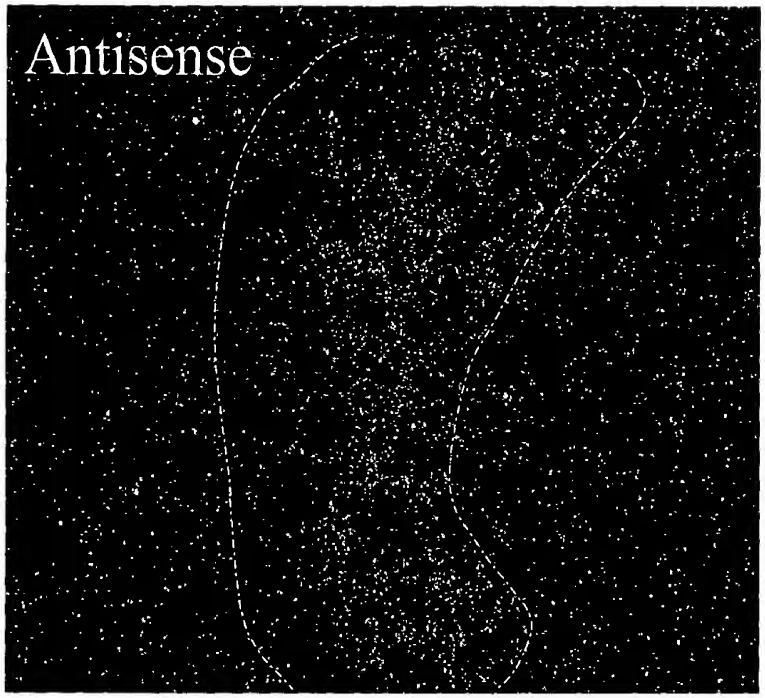


FIG. 14B

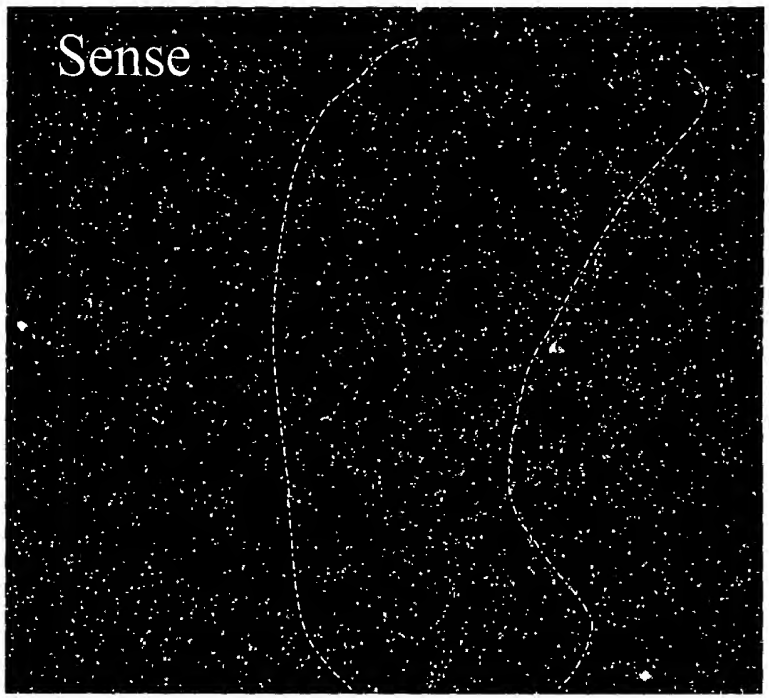


FIG. 15A

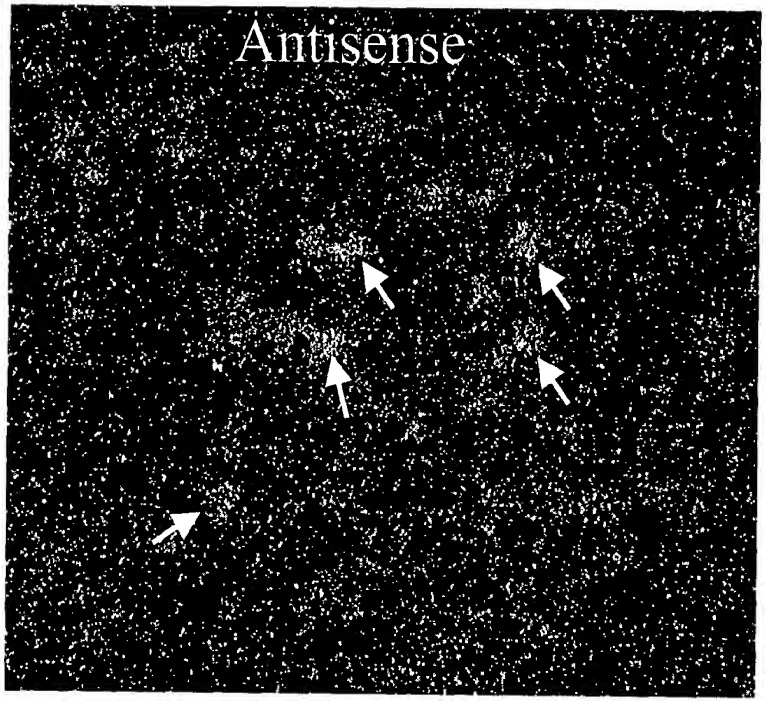


FIG. 15B

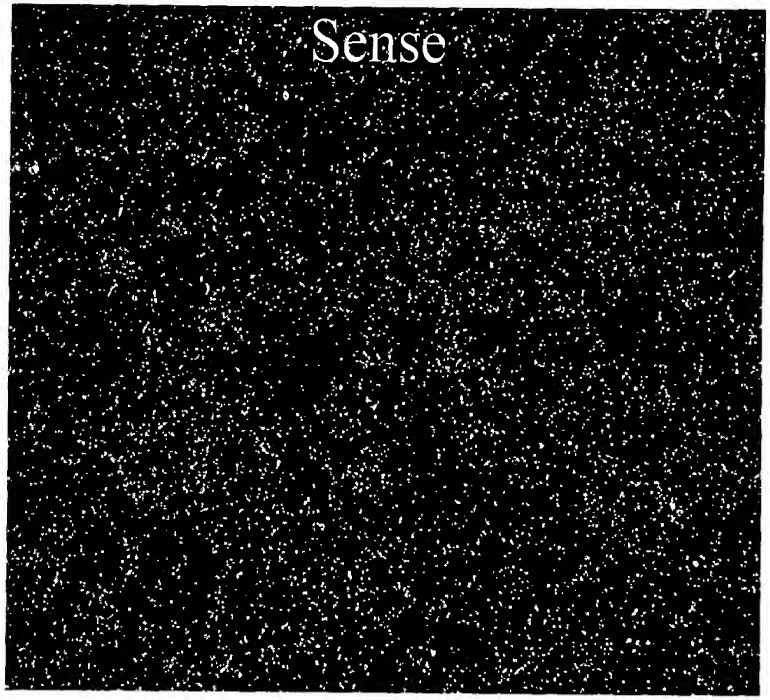


FIG. 16A

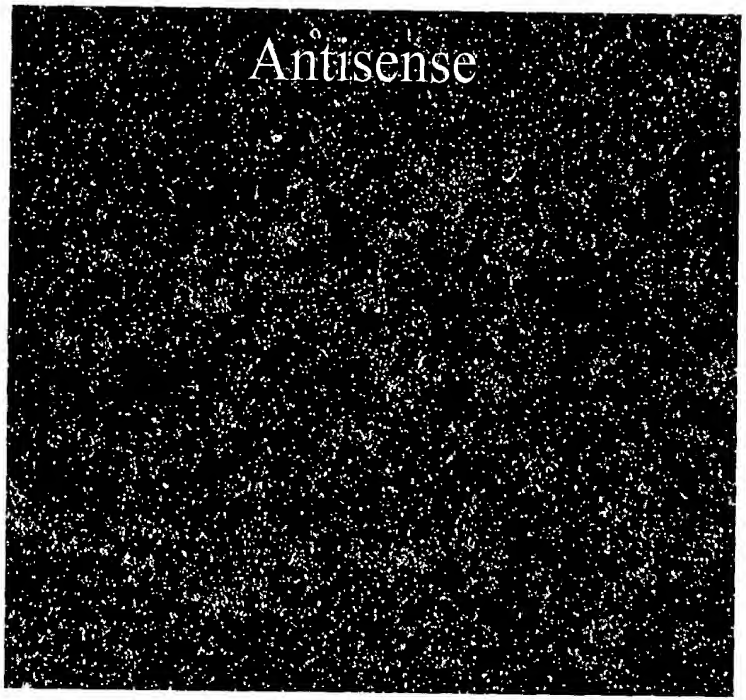


FIG. 16B

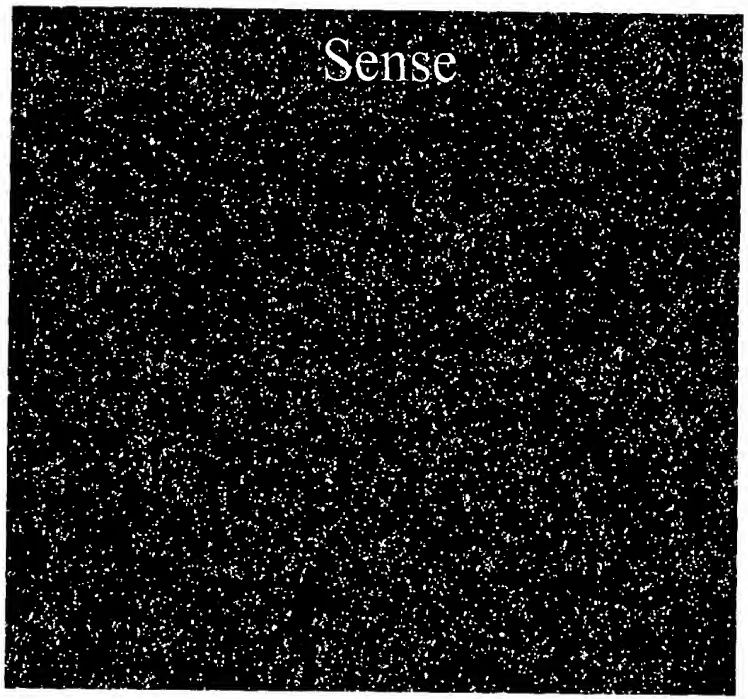


FIG. 17A

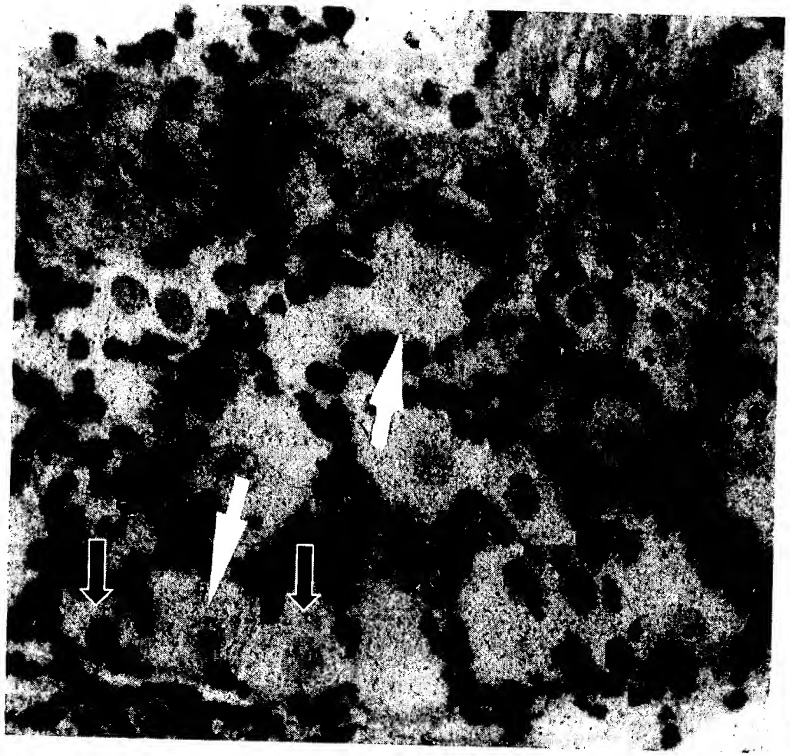


FIG. 17B

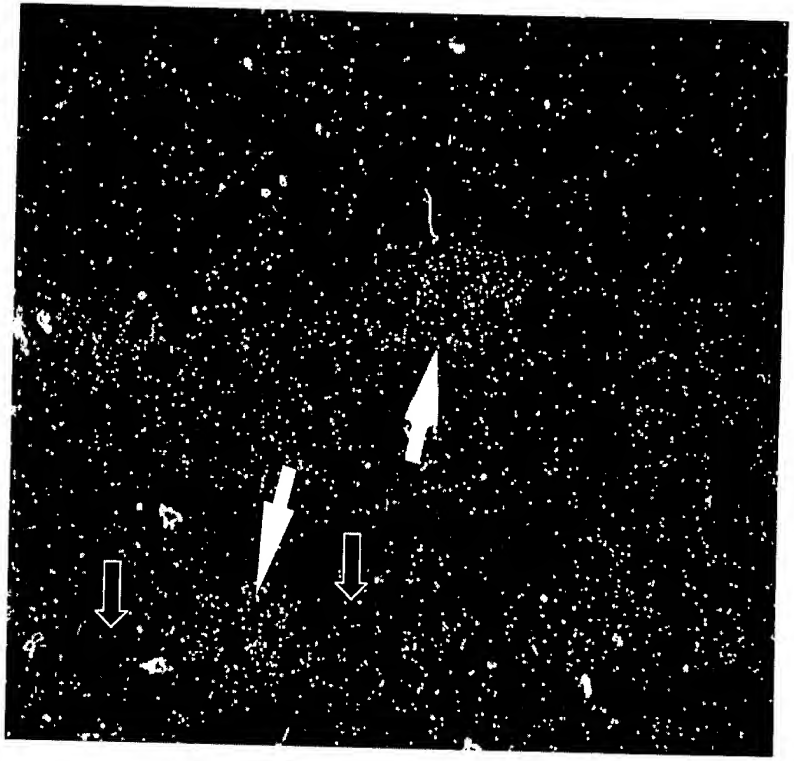


FIG. 18A

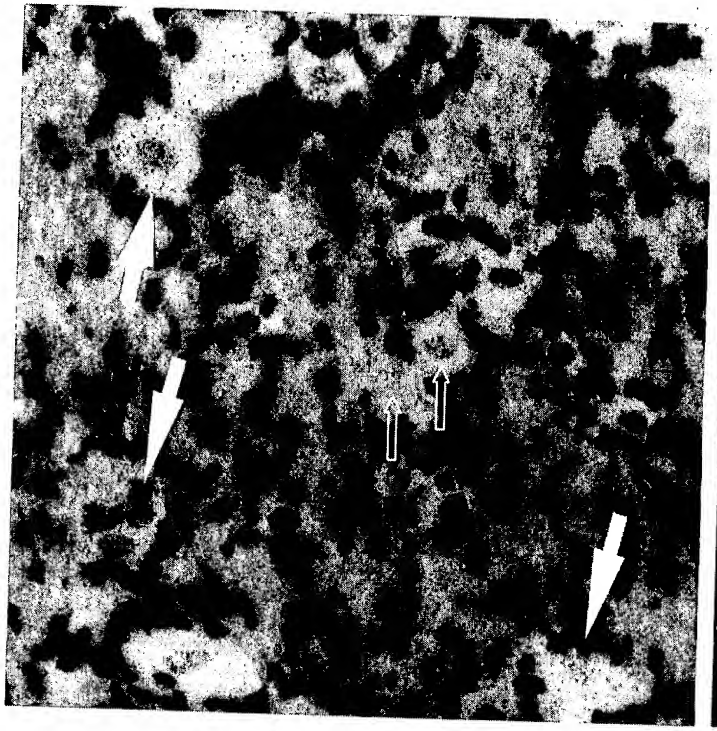


FIG. 18B